

WHAT IS CLAIMED IS:

1. A method of generating object region data relating to object regions in frames of moving picture, the frames lined up in a time-series variation, the method comprising:

approximating the object region in each of the frames with a polygon, the polygon having vertexes;

associating the vertexes in each of the frames with the respective vertexes in an adjacent frame of each of the frames;

obtaining trajectories linking the vertexes associated together based on the time-series variation of the frames; and

generating the object region data based on the trajectories.

2. The method according to claim 1, wherein the vertexes in each of the frames are associated with the respective vertexes in the adjacent frame such that a distance between the vertexes in each of the frames and the respective vertexes in the adjacent frame is minimum.

3. The method according to claim 2, wherein the distance between the vertexes in each of frames and the respective vertexes in the adjacent frame is calculated after a center of gravity of the polygon in the each of the frames coincides with a center of gravity of the polygon in the adjacent frame.

4. The method according to claim 2, wherein each of trajectories is approximated by a predetermined function, and the object region data is generated by using a parameter for the function.

5. The method according to claim 2, wherein the object region data includes position data of the vertexes of each of the frames and association data indicting correspondence of the vertexes between the frames.

6. A method according to claim 1, wherein the associating the vertexes with the respective vertexes comprises estimating vertexes in the adjacent frame based on the vertexes in the frames preceding to the adjacent frame, and selecting the vertexes in the adjacent frame, that are closest to the estimated vertexes.

7. The method according to claim 6, wherein each of the trajectories is approximated by a predetermined function, and the object region data is generated by using a parameter for the function.

8. The method according to claim 6, wherein the object region data includes position data of the vertexes of each of the frames and association data indicting correspondence of the vertexes between the frames.

9. The method according to claim 1, wherein the vertexes in each of frames have a characteristic

quantity and the vertex in each of the frames and the vertex in the adjacent frame which have the closest characteristic quantity are associated with each other.

10. The method according to claim 9, wherein each  
5 of the trajectories is approximated by a predetermined function, and the object region data is generated by using a parameter for the function.

11. The method according to claim 9, wherein the  
10 object region data includes position data of the vertexes of each of the frames and association data indicating correspondence of the vertexes between the frames.

12. A method of generating object region data  
15 relating to an object region in moving picture data having a plurality of frames, the method comprising:

approximating the object region in each of the plurality of frames with a polygon;

20 estimating a plurality of vertexes of the polygon in a given frame based on trajectory data indicating vertexes of the polygon from a first frame to an immediately preceding frame of the given frame;

modifying the plurality of vertexes estimated so as to be associated with the object region in the given frame;

25 obtaining trajectory data indicating vertexes of the polygon from the first frame to the given frame; and

generating the object region data based on the trajectory data indicating vertexes of the polygon from the first frame to the given frame.

13. The method according to claim 12, wherein each  
5 of the plurality of trajectories is approximated by a predetermined function, and the object region data is generated by using a parameter for the function.

14. The method according to claim 12, wherein the  
10 object region data includes position data of the vertexes of each of the plurality of frames and association data indicating correspondence of the vertexes between the plurality of frames.

15. A method of generating a polygon that approximates an object region in an image, the method  
15 comprising:

extracting a contour of the object region to generate an initial polygon;

obtaining a characteristic quantity of each of vertexes of the initial polygon;

20 selecting the vertex to be deleted based on the characteristic quantity;

deleting the selected vertex;

correcting a position of vertexes adjacent to the deleted vertex, thereby performing processing for  
25 updating the polygon; and

repeatedly performing the processing until a predetermined ending condition has been met, thereby

generating the polygon that approximates the object region.

16. An apparatus for generating object region data relating to object regions in frames of moving picture, the frames lined up in a time-series variation, the apparatus comprising:

an approximation unit configured to approximate the object region in each of the frames with a polygon, the polygon having vertexes;

an association unit configured to associate the vertexes in each of the frames with the respective vertexes in an adjacent frame of each of the frames;

a trajectory unit configured to obtain trajectories linking the vertexes associated together based on the time-series variation of the frames; and

a data generation unit configured to generate the object region data based on the trajectories.

17. The apparatus according to claim 16, wherein the association unit associates the vertexes in each of the frames with the respective vertexes in the adjacent frame such that a distance between the vertexes in each of the frames and the respective vertexes in the adjacent frame is minimum.

18. The apparatus according to claim 16, wherein the association unit comprises an estimation unit configured to estimate vertexes in the adjacent frame based on the vertexes in the frames preceding to the

adjacent frame, and a selector configured to select the vertexes in the adjacent frame, that are closest to the estimated vertexes.

19. The apparatus according to claim 16, wherein  
5 the vertexes in each of frames have a characteristic quantity and the vertex in each of the frames and the vertex in the adjacent frame which have the closest characteristic quantity are associated with each other.

20. An apparatus for generating object region data  
10 relating to an object region in moving picture data having a plurality of frames, the apparatus comprising:

an approximation unit configured to approximate the object region in each of the plurality of frames with a polygon;

15 an estimation unit configured to estimate a plurality of vertexes of the polygon in a given frame based on trajectory data indicating vertexes of the polygon from a first frame to an immediately preceding frame of the given frame;

20 a modifying unit configured to modify the plurality of vertexes estimated so as to be associated with the object region in the given frame;

a trajectory unit configured to obtain trajectory data indicating vertexes of the polygon from the first  
25 frame to the given frame; and

a data generation unit configured to generate the object region data based on the trajectory data

indicating vertexes of the polygon from the first frame to the given frame.

21. An apparatus for generating a polygon that approximates an object region in an image, the apparatus comprising:

an extraction unit configured to extract a contour of the object region to generate an initial polygon;

a characteristic quantity unit configured to obtain a characteristic quantity of each of vertexes of the initial polygon;

a selector configured to select the vertex to be deleted based on the characteristic quantity;

a deletion unit configured to delete the selected vertex;

a correction unit configured to correct a position of vertexes adjacent to the deleted vertex, thereby performing processing for updating the polygon; and

a controller configured to repeatedly perform the processing until a predetermined ending condition has been met, thereby generating the polygon that approximates the object region.

22. An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein, the computer readable program code means comprising:

first computer readable program code means for causing a computer to approximate the object region in

each of the frames with a polygon, the polygon having vertexes;

second computer readable program code means for causing a computer to associate the vertexes in each of the frames with the respective vertexes in an adjacent frame of each of the frames;

third computer readable program code means for causing a computer to obtain trajectories linking the vertexes associated together based on the time-series variation of the frames; and

fourth computer readable program code means for causing a computer to generate the object region data based on the trajectories.

23. The article of manufacture according to claim 22, wherein the second computer readable program code means causes a computer to associate vertexes in each of the frames with the respective vertexes in the adjacent frame such that a distance between the vertexes in each of the frames and the respective vertexes in the adjacent frame is minimum.

24. The article of manufacture according to claim 22, wherein the second computer readable program code means causes a computer to estimate vertexes in the adjacent frame based on the vertexes in the frames preceding to the adjacent frame, and select the vertexes in the adjacent frame, that are closest to the estimated vertexes.



25. The article of manufacture according to  
claim 22, wherein the vertexes in each of frames have a  
characteristic quantity and the vertex in each of the  
frames and the vertex in the adjacent frame which have  
5 the closest characteristic quantity are associated with  
each other.

26. An article of manufacture comprising a  
computer usable medium having computer readable program  
code means embodied therein, the computer readable  
10 program code means comprising:

first computer readable program code means for  
causing a computer to approximate the object region in  
each of the plurality of frames with a polygon;

second computer readable program code means for  
15 causing a computer to estimate a plurality of vertexes  
of the polygon in a given frame based on trajectory  
data indicating vertexes of the polygon from a first  
frame to an immediately preceding frame of the given  
frame;

20 third computer readable program code means for  
causing a computer to modify the plurality of vertexes  
estimated so as to be associated with the object region  
in the given frame;

fourth computer readable program code means for  
25 causing a computer to obtain trajectory data indicating  
vertexes of the polygon from the first frame to the  
given frame; and

fifth computer readable program code means  
for causing a computer to generate the object  
region data based on the trajectory data indicating  
vertexes of the polygon from the first frame to the  
5 given frame.

27. An article of manufacture comprising a  
computer usable medium having computer readable program  
code means embodied therein, the computer readable  
program code means comprising:

10 first computer readable program code means for  
causing a computer to extract a contour of the object  
region to generate an initial polygon;

second computer readable program code means for  
causing a computer to obtain a characteristic quantity  
15 of each of vertexes of the initial polygon;

third computer readable program code means for  
causing a computer to select the vertex to be deleted  
based on the characteristic quantity;

fourth computer readable program code means for  
20 causing a computer to delete the selected vertex;

fifth computer readable program code means for  
causing a computer to correct a position of vertexes  
adjacent to the deleted vertex, thereby performing  
processing for updating the polygon; and

25 sixth computer readable program code means for  
causing a computer to repeatedly perform the processing  
until a predetermined ending condition has been met,

thereby generating the polygon that approximates the object region.